



Optimizing Limited School Land as a Food Security Educational Medium through Numeracy Literacy for Elementary School Teachers in Kupang City

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ABSTRAK

Limited school land in urban areas can be developed as a contextual learning resource while simultaneously introducing food security practices to elementary school communities. This community service program aims to optimize the use of limited school land as an educational medium for food security integrated with numeracy literacy for elementary school teachers in Kupang City. The program was designed for partner schools, SD Inpres Oebufu and SD Inpres Oepoi, through coordination, socialization, preparation of learning media, urban farming workshops, demonstrations, direct practice, and mentoring. At the progress-report stage, activities that had been completed included coordination with partner schools, program socialization, preparation of activity schedules, provision of planting media, supporting equipment and seedlings, and preparation of workshop materials. Meanwhile, the formation of an educational garden, implementation of numeracy-based learning, mentoring, learning modules, and scientific publication were still in the subsequent implementation stage. The program is expected to strengthen teachers' capacity to utilize limited school land as a contextual learning resource integrating food security, environmental awareness, and numeracy literacy.

Kata Kunci: limited school land; food security; numeracy literacy; school urban farming; elementary school teachers

INTRODUCTION

Food security is closely related to the sustainability of community life and can be introduced through educational environments from an early age. Schools are not only places for academic learning but also strategic environments for developing environmental awareness, independence, and responsible utilization of available resources. In this context, the school environment can be developed as a contextual learning resource that connects academic concepts with real-life situations.

Kupang City has geographical and climatic characteristics that present challenges for productive land utilization. The dry climate, relatively long dry season, and increasing development of urban areas contribute to limitations in productive land availability. At the same time, schools in urban areas

generally have limited open spaces that have not always been utilized productively. The availability of small unused spaces, however, provides opportunities for developing simple food-producing activities through urban farming approaches. Food production in limited spaces can be developed through techniques such as polybags, vertical planting, and simple hydroponics (FAO, 2022; Kementerian Pertanian RI, 2021).

The educational potential of school gardens is not limited to food production. The garden can become a contextual learning medium through activities involving observation, measurement, recording, comparison, classification, and presentation of data. These activities provide opportunities for teachers to connect environmental experiences with numeracy literacy. For example, students can measure plant height, count leaves, compare plant growth, record observations, calculate growth rates, and present observations in tables or graphs. The initial identification conducted with partner schools, SD Inpres Oebufu and SD Inpres Oepoi in Kupang City, indicated that the utilization of available school spaces as educational gardens based on food security had not been optimal. The available spaces had not yet been fully developed as learning resources, particularly for integrating environmental activities with numeracy literacy. Teachers also needed strengthening in designing simple activities that could connect environmental conditions with classroom learning.

Based on these conditions, the community service program was designed to optimize limited school land through simple urban farming while integrating its utilization with numeracy literacy activities. The program focuses on strengthening teachers' capacity so that the school environment can function not only as a place for growing plants but also as a contextual learning laboratory. The approach combines workshop activities, demonstrations, practice, and subsequent mentoring.

The objective of this community service program is to provide elementary school teachers with knowledge and practical experience in utilizing limited school land through simple urban farming techniques and integrating plant-growth activities with numeracy literacy. Through this approach, the program is expected to support the development of an educational school garden that contributes to food-security education, environmental awareness, and contextual learning.

METHOD

The community service program was implemented through a participatory approach involving the PKM implementation team and partner schools. The partner schools were SD Inpres Oebufu and SD Inpres Oepoi, located in Kupang City, East Nusa Tenggara. The target participants were elementary school teachers. The program was designed as a combination of workshop, demonstration, direct practice, discussion, and mentoring.

1. Planning and Preparation. The planning stage included coordination with partner schools, determining the implementation schedule, identifying needs, dividing team responsibilities, preparing workshop materials, and preparing facilities and equipment. The team also prepared planting media, seeds, seedlings, and plants at different growth stages.

2. Workshop Preparation. The workshop was designed to provide teachers with conceptual understanding and practical skills concerning food security, utilization of limited land, and simple urban farming techniques, including polybag planting, vertical planting, and simple hydroponics.

3. Integration of Numeracy Literacy. Urban farming activities were designed to be connected with simple numeracy activities such as measuring plant height, counting leaves, recording growth,

comparing plant conditions, organizing observations into tables, and presenting growth data through graphs.

4. Mentoring and Monitoring. Following the workshop, mentoring was planned to support implementation of the educational garden and integration of urban farming activities into learning. Monitoring would focus on plant growth, management of the educational garden, utilization of the garden as a learning medium, and development of numeracy-based learning activities.

5. Evaluation. Evaluation was designed to examine implementation and achievement of program targets. Planned indicators include teachers' understanding of limited-land utilization, ability to recognize plant growth stages, ability to develop contextual numeracy activities, implementation of the educational garden, and development of learning materials. Because the source document represents a progress report, quantitative post-test results and final program outcomes were not yet available at the reporting stage.

RESULTS AND DISCUSSION

1. Identification of Partner Needs

Initial identification showed that limited school land represented both a constraint and an opportunity. The constraint concerned the availability of space for conventional cultivation, while the opportunity concerned the possibility of utilizing vertical space, containers, and other simple planting systems. Polybags, vertical planting, and simple hydroponics provide alternatives that require relatively limited land.

From an educational perspective, the main value of the program lies in transforming an underutilized school space into a contextual learning environment. The school garden can function as a place where teachers and students observe actual biological processes while simultaneously using numerical information generated from those processes. Food-security education can therefore be introduced through concrete experiences rather than solely through theoretical explanations (FAO, 2021; FAO, 2022).

2. Coordination and Socialization with Partner Schools

At the progress-report stage, coordination and socialization with partner schools had been completed. Coordination was used to align the program with school conditions and schedules, establish a common understanding of objectives and roles, and prepare the subsequent workshop and mentoring stages. The activity schedule was prepared jointly with the partner schools.

This participatory coordination was important because school activities and teacher availability influenced the timing of the workshop and subsequent mentoring. The process also positioned the schools as active partners in implementation and maintenance rather than merely as recipients of the program.

3. Preparation of Urban Farming Media and Materials

The team had prepared planting media, supporting equipment, and seedlings for practical activities. Workshop materials and implementation devices were also prepared. Seedlings and plants at different stages of growth were prepared to support demonstrations concerning the plant-growth cycle.

The preparation of different growth stages provides an educational opportunity to observe continuity in plant development. Plant height, number of leaves, and other observable characteristics can

subsequently be measured and documented. These data can be organized into tables and graphs as part of numeracy learning.

4. Planned Integration of Urban Farming and Numeracy Literacy

The distinctive aspect of the program is the integration of urban farming with numeracy literacy. The garden is positioned not merely as a facility for growing plants but as a learning medium. Planned activities include measuring plant height, counting leaves, recording growth, comparing plants, calculating growth, organizing observations into tables, and presenting data through graphs.

No.	Urban Farming Activity	Numeracy Activity	Potential Learning Output
1	Observing seedlings	Counting and identifying growth stages	Observation record
2	Measuring plant height	Comparing measurements	Measurement table
3	Counting leaves	Calculating differences	Growth data
4	Monitoring growth	Recording data periodically	Growth table
5	Comparing plants	Determining differences	Comparison results
6	Monitoring development	Presenting data	Growth graph
7	Estimating harvest	Simple calculation	Harvest estimation

The integration illustrates that numeracy literacy can be developed through authentic objects available in the school environment. Plant growth provides measurable objects for introducing numbers, measurement, comparison, data organization, and graphical representation. The approach is compatible with contextual learning principles in the Merdeka Curriculum (Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2022).

5. Progress of Program Outputs

At the time of the progress report, several outputs had been achieved while others remained in the implementation stage. The progress is summarized below.

No.	Program Output	Progress Status
1	Coordination with partner schools	Achieved
2	Program socialization to teachers	Achieved
3	Joint activity schedule	Achieved
4	Planting media and supporting equipment	Achieved
5	Seeds/seedlings for practical activities	Achieved

6	Workshop materials and implementation devices	Achieved
7	Educational school garden	Subsequent stage
8	Numeracy-based learning implementation	Subsequent stage
9	Learning module	Subsequent stage
10	Scientific article	Subsequent stage
11	Final PKM report	Subsequent stage

The distinction between achieved and subsequent outputs is important because the source document represents a progress report rather than a final report. The main achievement at this stage was the establishment of the foundation for implementation through coordination, preparation, and provision of materials. Physical development of the educational garden, implementation of learning, monitoring, and final academic outputs remained for subsequent stages.

6. Implementation Constraints and Adaptation

The implementation encountered practical constraints concerning school schedules, teachers' available time, and preparation of planting materials. The team adjusted the activity schedule in consultation with partner schools. One adaptation was the preparation of plants at different growth stages so that a broader plant-growth cycle could be demonstrated within a limited workshop period.

This experience indicates that school-based community service programs require flexibility. Program schedules need to consider school activities and teacher availability. Active communication between the university team and school partners is therefore essential for program continuity.

7. Sustainability Potential

The program has potential for sustainability because the proposed activities use relatively simple cultivation techniques and can be integrated into routine school learning. Once an educational garden has been established, it can be maintained by teachers and students and used repeatedly as a learning resource.

Sustainability should not be measured only by the continued existence of plants but also by the continued use of the garden as a learning resource. The next stage should therefore emphasize the connection between garden management and lesson planning, particularly observation, measurement, data recording, and interpretation.

CONCLUSION

The community service program on optimizing limited school land as an educational medium for food security and numeracy literacy was designed in response to conditions at SD Inpres Oebufu and SD Inpres Oepoi in Kupang City. At the progress-report stage, the program had achieved several foundational outputs, including coordination with partner schools, program socialization, preparation of implementation schedules, availability of planting media and equipment, preparation of seedlings, and development of workshop materials.

The program has established a framework for integrating simple urban farming with contextual numeracy literacy activities. Activities such as measuring plant height, counting leaves, recording growth, comparing plants, and presenting data in tables and graphs can potentially transform the school

environment into an authentic learning resource. However, the educational garden, direct implementation of numeracy-based learning, mentoring, monitoring, learning-module development, and final scientific outputs remained part of subsequent stages at the time of reporting.

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